Project At a Glance

Title

Exploring the Impact of Swashes (Tidal Creeks) on Coastal Water Quality

Place

Greater Myrtle Beach Area, South Carolina

Reserve

North Inlet-Winyah Bay NERR

Intended Users

- ✔ South Carolina Department of Health and Environmental Control
- ✔ South Carolina Department of Natural Resources
- ✔ Horry County
- ✔ Local SMS4 municipalities

Project Team Partners

North Inlet-Winyah Bay NERR, South Carolina Sea Grant Consortium, Coastal Carolina University

Timeline

10/2010 to 10/2013

Learn More

Erik Smith
Principal investigator & research coordinator,
North Inlet-Winyah Bay NERR
843-904-9035
erik@belle.baruch.sc.edu

The Swash Cycle

In the summer of 2004, anglers casting off South Carolina's Myrtle Beach were surprised to find themselves in the heart of a flounder jubilee. The flatfish were so plentiful and slow moving you could practically scoop them up with a net. Scientists who happened to be on a local fishing pier that day and were able to confirm that oxygen levels in nearshore waters had dipped to a point of hypoxia, creating a dead zone that was driving suffocating flounder toward the shore.

For communities dependent on coastal tourism, this event was unexpected and troubling. Out of that concern emerged the Long Bay Working Group (LBWG), a group of resource managers and scientists dedicated to understanding the causes of hypoxia in local waters. Their research has suggested the local hypoxic events are not directly fueled by phytoplankton blooms in the ocean. Instead, it appeared that the necessary ingredients for future flounder jubilees might be coming from other sources, including swashes—tidal creeks that traverse the local beach faces, funneling stormwater runoff and groundwater from a heavily developed landscape directly into coastal waters.

A team led by the North Inlet-Winyah Bay NERR is working with stakeholders to test the idea that swashes collect, transform, and export the nutrients and organic matter required to fuel hypoxia along the coast. They plan to share what they learn with state agencies and local governments interested in making land use and stormwater management decisions that protect coastal water quality in the Myrtle Beach Area.

Local Context

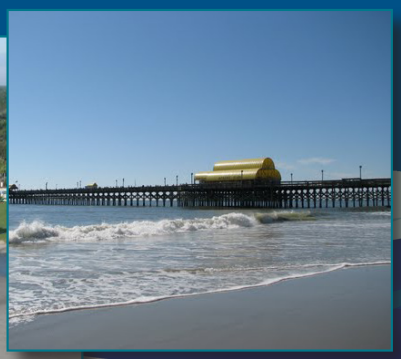
Myrtle Beach is an economic pearl in South Carolina's "Grand Strand," a sixty-mile stretch of beaches and resort communities that draw roughly 15 million visitors each year and generate about 40 percent of the state's

Swashes are a common stormwater management approach in the Myrtle Beach Area

$16 billion tourist industry. Fishing and water sports top the list of local attractions, making coastal water quality a priority concern.

Addressing that concern, however, is a challenge along a heavily developed coast where much of the runoff washes into coastal waters through swashes that have been modified in shape and hydrology. Preliminary data indicates that nutrients and organic matter are most concentrated in coastal waters around the swashes, yet very little is known about how surface and ground waters mix and flow through swashes, or how they might transform the nutrients and organic matter passing through them into forms more likely to lead to hypoxia.

The North Inlet-Winyah Bay NERR lies south of the Myrtle Beach area. The Reserve has identified the impacts of coastal growth on water and habitat quality and ecological communities as its top research and management priority. Through the LBWG, Reserve staff have contributed to the research ilooking at hypoxia events off Myrtle Beach and are also active participants in the Coastal Watershed Stormwater Education Coalition (CWSEC), a collaborative network of education providers and SMS4 stormwater managers.



Apache Pier (above) was the site of a hypoxia-driven flounder jubilee in 2004. This project will explore the role of swashes (left) in hypoxic events that now occur in South Carolina's coastal waters.

Project Goals

The project team aims to better understand how local land use and stormwater management practices affect the flow and transformation of nutrient and organic matter as it moves into, through, and out of swashes into coastal ocean waters. Ultimately, they hope to provide the scientific information needed to make land use and stormwater management decisions that improve and protect coastal water quality, particularly with respect to hypoxia, in South Carolina's Greater Myrtle Beach Area.

Approach

Collaborative

This project's collaborative approach will build on successful working relationships between scientists, educators, and decision makers that were established through the LBWG and the CWSEC. The project team will continue to follow the six-step Joint Fact Finding process—already underway with these groups and other stakeholders—with activities that include a series of workshops :

- Preliminary collaborative workshop with local and state intended users to discuss research goals, methods, and limitations; current stormwater management activities; available data and information; swash classification; and changes in the project study design based on the discussions.
- Second workshop and follow up discussions to vet the classification approach and selection of the first two swashes to study.
- Third workshop to discuss mid-project findings, the identification of the second set of swashes to study, and potential management implications and actions.
- Final workshop to discuss research findings and their implications for management and to identify potential management actions.

Ecology, Environmental Engineering

The project team will augment existing knowledge about the physical forces and human activity that impact coastal water quality in this area with a deeper understanding of the role of swashes in this context. Over the next three years, they will:

- Work with local partners to develop a method to categorize 14 swashes according to their physical characteristics and hydrology, and the stormwater infrastructure and land use in the surrounding watershed.
- Use the classification scheme to select four swashes, the study of which will be most informative from a research and a management perspective.
- Measure the concentrations and forms of nutrient and organic matter that flow into the selected swashes from stormwater runoff and groundwater flows.
- Characterize how the internal conditions and processes of the swash impact the transport and transformation of organic matter within the selected swashes.
- Quantify the form and tidal export of nutrients and organic matter from swashes.

SUPPORT FOR THIS PROJECT

This project was funded by the NERRS Science Collaborative.

The Science Collaborative uses a competitive process to identify and fund science to address environmental challenges in communities served by Reserves. Projects are selected through annual competitions, designed to insure that investigators, intended users of the science, and relevant stakeholders work together to describe science needs to address specific problems, define research questions, design and implement projects, and apply the results.

The program works with outreach specialists, trainers, and communicators to share information about the science that it funds with other Reserves and the broader coastal management community.

The Science Collaborative also sponsors Training for the Integration of Decision-Making and Ecosystem Science (TIDES), a UNH-based program that helps develop the skills needed to link science-based information to coastal resource management decisions. TIDES offers a non-thesis master's degree track and is developing a professional certification program.

The NERRS Science Collaborative is administered by the University of New Hampshire (UNH) through a cooperative agreement with the National Oceanic and Atmospheric Administration (NOAA).

For more information, please contact:

Dolores Leonard
603-862-3685
dolores.leonard@unh.edu